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Lee et al.

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[45] Date of Patent: Jul. 18, 2000

[54] **PORTABLE INFORMATION TERMINAL AND AN ACTIVATING METHOD THEREOF**

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[73] Assignee: **Samsung Electronics Co., Ltd.**, Kyungki-do, Rep. of Korea

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[22] Filed: **Feb. 6, 1998**

[30] **Foreign Application Priority Data**

Apr. 11, 1997 [KR] Rep. of Korea 97-13423

[51] **Int. Cl.**[7] **G08C 21/00**

[52] **U.S. Cl.** **178/18.01**; 178/18.03; 178/18.05; 178/18.06; 178/18.07; 178/18.1

[58] **Field of Search** 345/169, 173, 345/174, 175, 176, 177, 178, 179; 178/18.01, 18.02, 18.04, 18.05, 18.03, 18.06, 18.07, 18.1; 379/61

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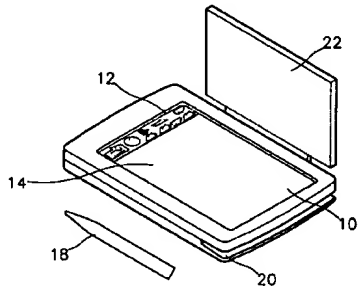
Primary Examiner—Vijay Shankar

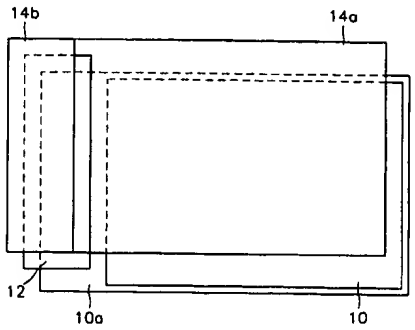
Attorney, Agent, or Firm—Sughrue, Mion, Zinn, Macpeak & Seas, PLLC

[57] **ABSTRACT**

A portable information terminal is provided. The terminal includes a touch screen panel having an activation area and an activating unit. The activation unit activates the portable information terminal when the terminal is turned off and an activating position on the activation area is pressed for a predetermined time. The activating unit contains a press position sensor, a press timer, and a controller. The press position sensor senses if a panel position on touch screen panel is pressed and determines a location of the panel position on the touch screen panel to generate corresponding press position data. The press timer determines if the panel position is pressed for at least a predetermined time to generate corresponding press time data. The controller inputs the press position data and the press time data, determines if the panel position is located within the activation area based on the press position data, and controls power supplied to various components of the portable information terminal such that the power is supplied when the panel position is located within the activation area and when the activation area is pressed for at least the predetermined time.

13 Claims, 5 Drawing Sheets





• Fig. 5
• Coordinate
• Area

FIG. 1A

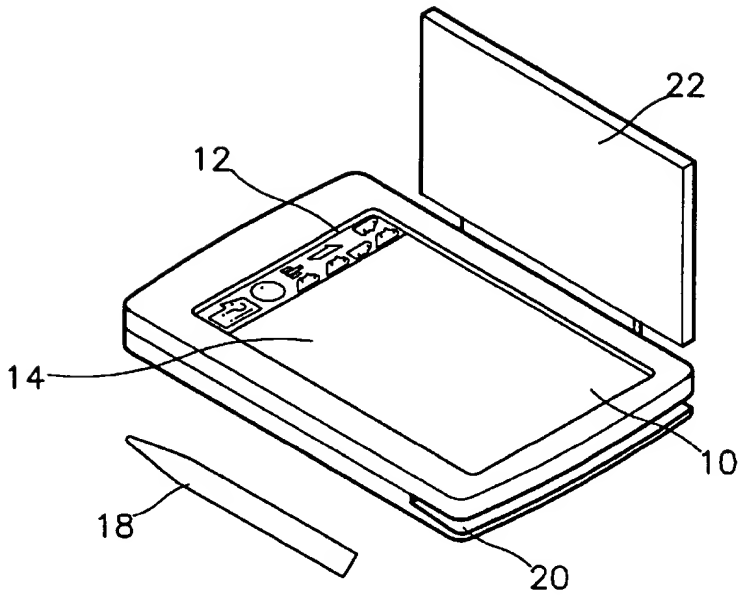


FIG. 1B

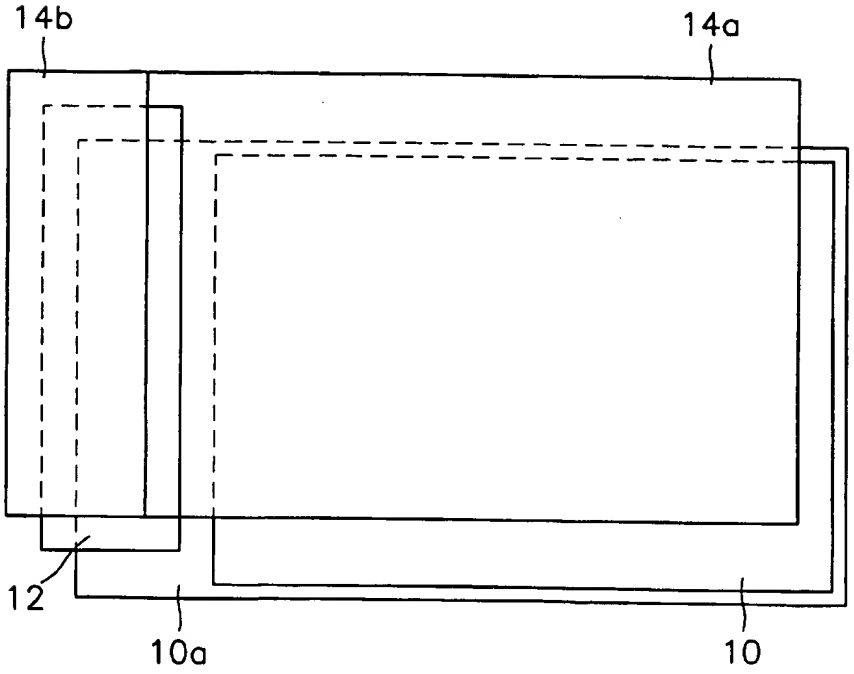


FIG. 2

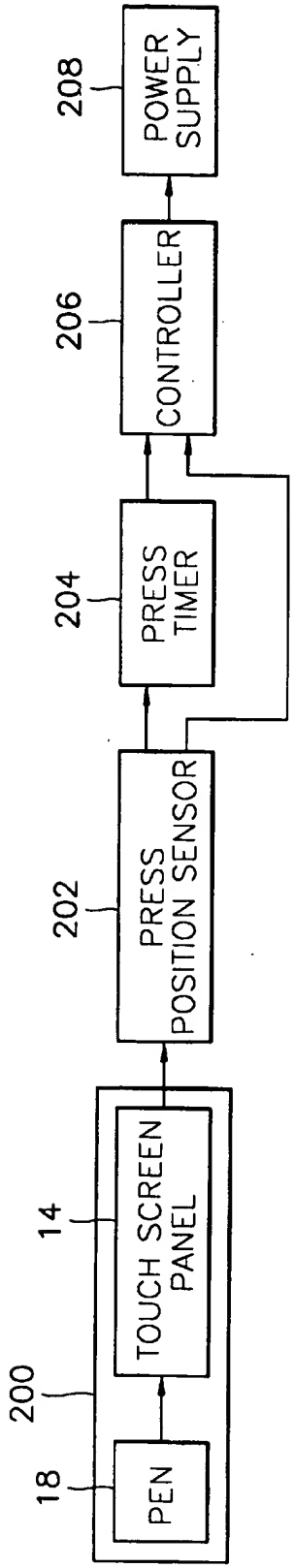

208
POWER SUPPLY
206
CONTROLLER
204
PRESS TIMER
202
PRESS POSITION SENSOR
14
TOUCH SCREEN PANEL
200
18
PEN

FIG. 3

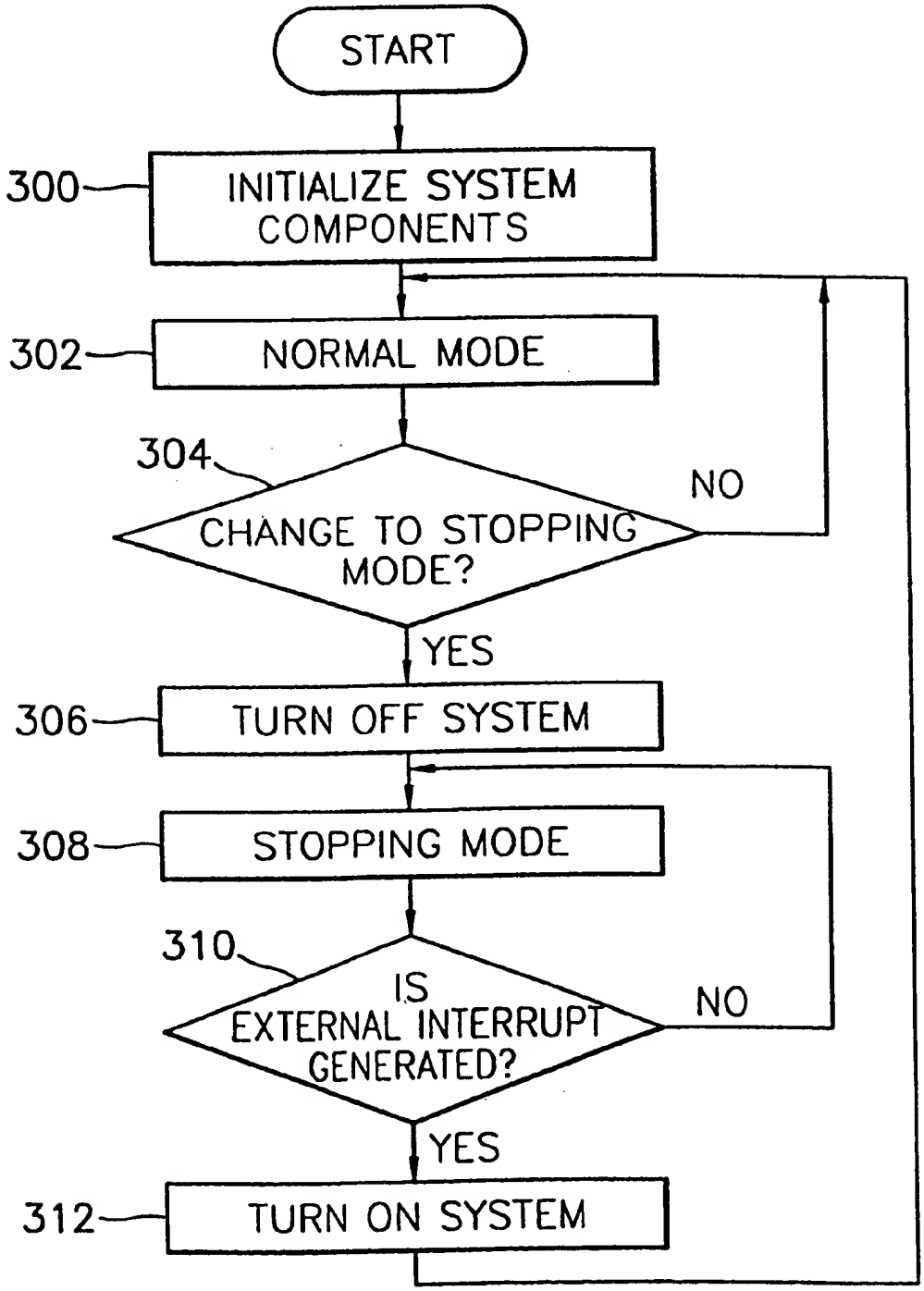

START
300
INITIALIZE SYSTEM COMPONENTS
302
NORMAL MODE
304
CHANGE TO STOPPING MODE?
NO
YES
306
TURN OFF SYSTEM
308
STOPPING MODE
310
IS EXTERNAL INTERRUPT GENERATED?
NO
YES
312
TURN ON SYSTEM

FIG. 4

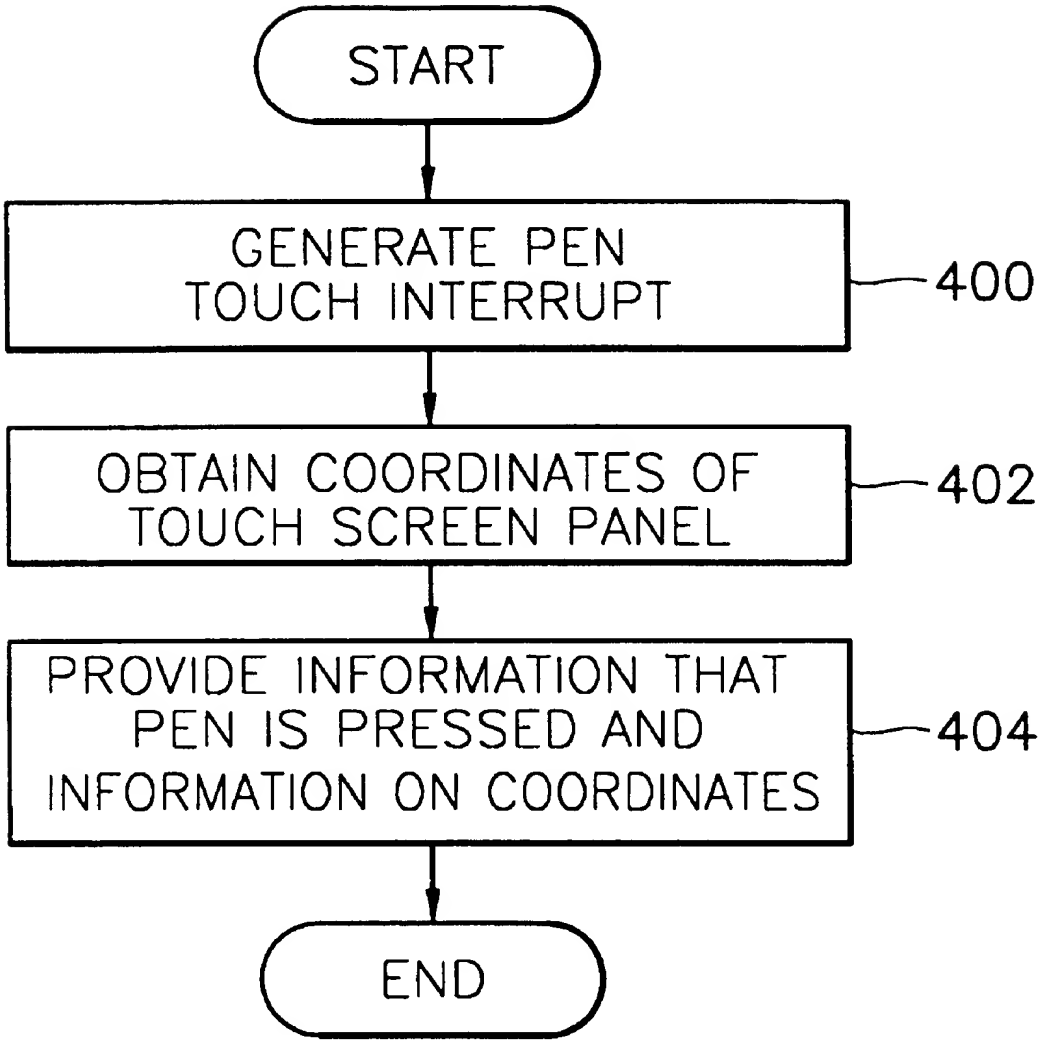
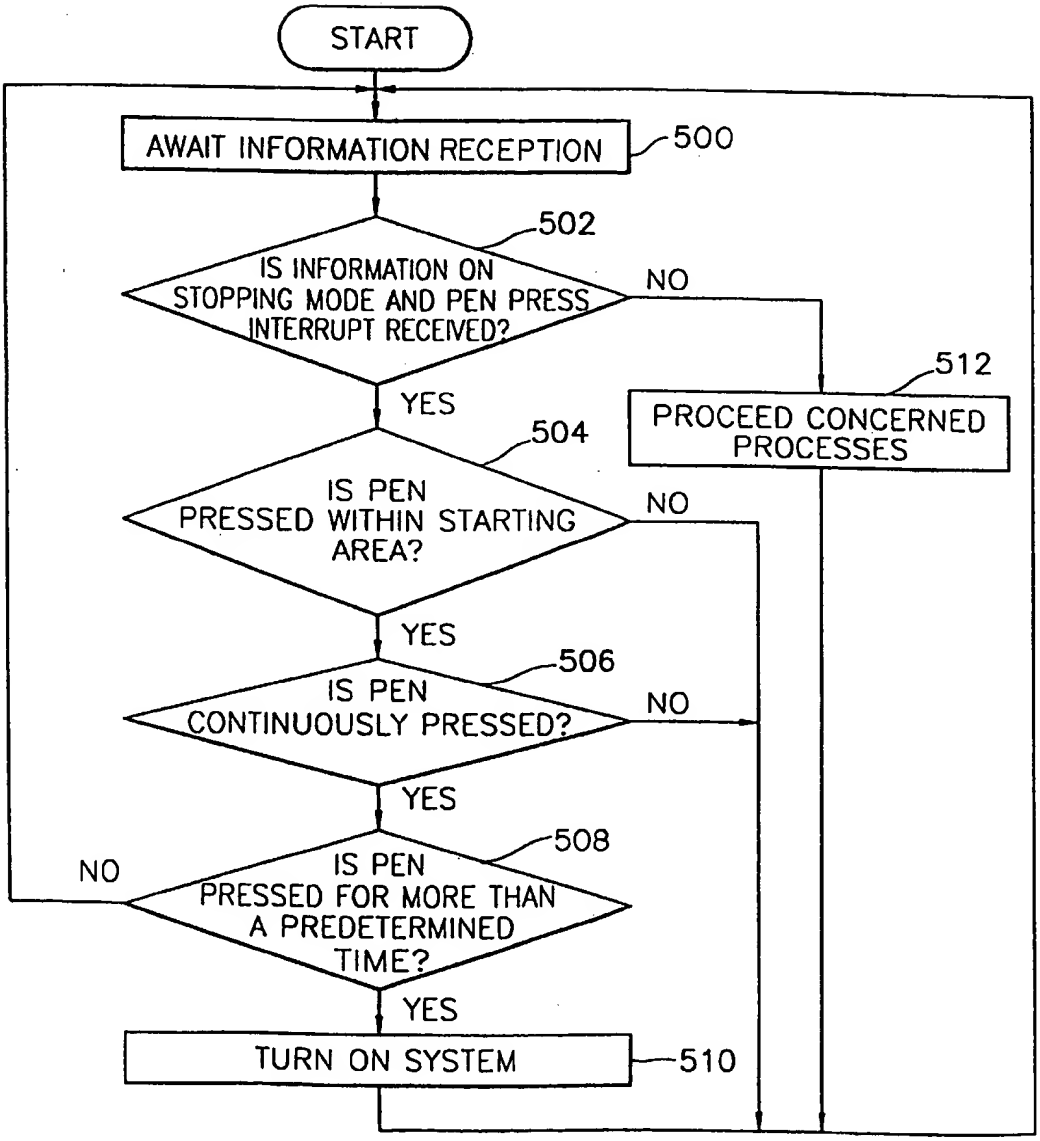

START
GENERATE PEN TOUCH INTERRUPT
400
OBTAIN COORDINATES OF TOUCH SCREEN PANEL
402
PROVIDE INFORMATION THAT PEN IS PRESSED AND INFORMATION ON COORDINATES
404
END

FIG. 5


START
AWAIT INFORMATION RECEPTION
500
502
IS INFORMATION ON STOPPING MODE AND PEN PRESS INTERRUPT RECEIVED?
NO
YES
512
PROCEED CONCERNED PROCESSES
504
IS PEN PRESSED WITHIN STARTING AREA?
NO
YES
506
IS PEN CONTINUOUSLY PRESSED?
NO
YES
508
IS PEN PRESSED FOR MORE THAN A PREDETERMINED TIME?
NO
YES
TURN ON SYSTEM
510

PORTABLE INFORMATION TERMINAL AND AN ACTIVATING METHOD THEREOF

FIELD OF THE INVENTION

The present invention relates to a portable information terminal. More particularly, the present invention relates to a portable information terminal employing a touch screen panel and relates to an activating method thereof.

BACKGROUND OF THE INVENTION

In portable information terminals, software switching is used more often than hardware switching. When using software switching, a system is driven by pressing an device (e.g. a pen) onto a predetermined area of a touch screen panel ("TSP") which covers a liquid crystal screen and a program selection screen. When the system is to be turned off, a "turn-off" command is applied by pressing the pen on a certain area of the touch screen panel.

A conventional portable information terminal using software switching may contain one of two different activation areas on which a pen may be pressed to activate the terminal. The first activation area may be an icon image occupying a small area in the program selection area of the touch screen panel. The second activation area may correspond to the entire touch screen panel.

With respect to the first activation area, attention must be paid to ensure accurate selection since the activation area is small. With respect to the second activation area, a touch screen panel protection cover can inadvertently touch the touch screen panel when the portable information terminal is being transported in a briefcase, bag, etc. Thus, a microcontroller in the terminal may mistakenly assume that the pen is continuously pressed on the touch screen panel and the terminal may be erroneously turned on. As a result, power is consumed unnecessarily.

SUMMARY OF THE INVENTION

It is an object of the present invention to provide a portable information terminal in which a program selection area of a touch screen panel acts as a system activation area, and a system is activated only after pressing the activation area for a predetermined time.

It is another object of the present invention to provide a activating method of the portable information terminal.

To achieve one of the above objects, a portable information terminal is provided. The terminal comprises: a touch screen panel having an activation area; and an activating unit which activates said portable information terminal when said portable information terminal is turned off and an activating position on said activation area is pressed for a predetermined time. Also, the activating unit comprises a press position sensor which senses if a panel position on touch screen panel is pressed and determines a location of said panel position on said touch screen panel to generate corresponding press position data; a press timer which is coupled to said press position sensor and determines if said panel position is pressed for at least a predetermined time to generate corresponding press time data; and a controller, which inputs said press position data and said press time data, determines if said panel position is located within said activation area based on said press position data, and controls power supplied to various components of said portable information terminal such that said power is supplied when said panel position is located within said activation area and when said activation area is pressed for at least said predetermined time.

To achieve another one of the above objects, a method for activating a portable information terminal having a touch screen panel having an activation area is provided. The method comprises the steps of: (a) pressing a panel position of said touch screen panel when said portable information terminal is in a stopping mode; (b) determining said panel position where touch screen panel is pressed; (c) generating press information indicating that said panel position is pressed and indicating a location of said panel position when said touch screen panel is pressed; (d) determining if said panel position is located within said activation area of said touch screen panel based on said press information; (e) determining whether said panel position is pressed for longer than a predetermined time; and (f) supplying power to various components of said portable information terminal when said panel position is located within said activation area and is pressed for longer than said predetermined time.

BRIEF DESCRIPTION OF THE DRAWINGS

The above objectives and advantages of the present invention will become more apparent by describing in detail a preferred embodiment thereof with reference to the attached drawings in which:

FIG. 1A shows a portable information terminal according to the present invention;

FIG. 1B is a detailed view showing a liquid crystal screen, a program selection screen, and a touch screen panel shown in FIG. 1A;

FIG. 2 is a block diagram showing an activating apparatus in the portable information terminal shown in FIG. 1;

FIG. 3 is a flow chart describing a process of switching between a normal mode and a stopping mode in the portable information terminal according to the present invention;

FIG. 4 is a flow chart describing the process of a pen interrupt which is an embodiment of the generation of an external interrupt shown in FIG. 3; and

FIG. 5 is a flow chart describing the control of a power supply using information obtained from the process shown in the flow chart of FIG. 4.

DESCRIPTION OF THE PREFERRED EMBODIMENT(S)

The following description of the preferred embodiments discloses specific configurations. However, the preferred embodiments are merely examples of the present invention, and thus, the specific features described below are merely used to more easily describe such embodiments and to provide an overall understanding of the present invention. Accordingly, one skilled in the art will readily recognize that the present invention is not limited to the specific embodiments described below. Furthermore, the descriptions of various features, structures, and processes of the present invention which would have been known to one skilled in the art are omitted for the sake of clarity and brevity.

As shown in FIG. 1A, the portable information terminal includes a liquid crystal screen **10**, a program selection screen **12**, a touch screen panel **14**, a pen **18**, a pen holder **20**, and a protective cover **22**. The program selection screen **12** is adjacent to the liquid crystal screen **10**, and the touch screen panel **14** covers the liquid crystal screen **10** and the program selection screen **12**. The pen **18** is used to select a desired position on the touch screen panel **14**, and the pen holder **20** holds the pen **18** when it is not being used. The protective cover **22** covers the touch screen panel **14** and protects it when the system is not in use.

FIG. 1B is an exploded view which illustrates the liquid crystal screen **10**, the program selection screen **12**, and the touch screen panel **14** in more detail. The liquid crystal screen **10** and the program selection screen **12** are installed on a liquid crystal screen frame **10***a*, and a program selection icon sticker is attached to the program selection screen **12**. Also, the icon could be a liquid crystal or other image displayed on the screen **12**. The touch screen panel **14** is installed such that it covers the icon sticker of the program selection screen **12** and the liquid crystal screen **10**. The touch screen panel **14** is divided into a liquid crystal screen area **14***a* covering the liquid crystal screen **10** and a program selection area **14***b* covering the program selection screen **12**.

In the portable information terminal of the present invention, the program selection area **14***b* of the touch screen panel acts as a system activation area when the system is in a stopping mode and acts as a program selection area when the system is in a normal mode. In the normal mode, a plurality of icon stickers indicating respective operations of the terminal may be attached to the program selection screen **12**, and a user may select and execute a program to perform one of the operations by pressing a position on the touch screen panel above the corresponding icon.

FIG. **2** is a block diagram of an activating apparatus contained in the portable information terminal shown in FIGS. 1A and 1B. The activating apparatus includes an input unit **200**, a press position sensor **202**, a press timer **204**, a controller **206**, and a power supply **208**.

The input unit **200** comprises the pen **18** and the touch screen panel **14** and outputs a contact signal when the pen **18** touches the panel **14**. The press position sensor **202** senses when the screen panel **14** is pressed based on the contact signal and outputs a corresponding depression signal. The press timer **204** inputs the depression signal and determines whether or not the pressure sensed by the press position sensor **202** lasts for more than a predetermined time. The controller **206** controls the power supply **208** and instructs the power supply **208** to supply power to the system when the press position sensor **202** indicates that the system activation area of the touch screen panel is being pressed and the press timer **204** indicates that the activation area has been pressed for more than the predetermined time.

The operation of the activating apparatus shown in FIG. **2** is as follows. When a user presses a point on the touch screen panel **14** using the pen **18**, the press position sensor **202** senses whether the coordinate values of the pressed point are within the activation area of the touch screen panel **14**. If the pressed point is within the activation area, the press timer **204** determines whether or not the point has been pressed longer than a predetermined time. If the point is within the activation area and has been pressed longer than such time, the controller **206** controls the power supply **208** so that power is supplied to the system.

FIG. **3** is a flow chart illustrating a procedure for turning on the portable information terminal. When the system is initially turned on, various components of the system are initialized (step **300**), and the system operates in a normal mode (step **302**). In the normal mode, the user can select various operations by pressing the pen **18** on a corresponding icon in the program selection area. When the system is operating in the normal mode, it determines whether or not it should be switched to a stopping mode (step **304**). The system may be switched to the stopping mode when one or more conditions are satisfied. For example, the system may be placed in a stopping mode when a user selects a system shutdown menu item, when a predetermined time has passed without any input, and/or when other critical situations occur such as the rapid reduction of a battery voltage. When the system determines to switch to the stopping mode, the system is immediately turned off (step **306**). In such case, the system is switched to a power saving mode in which the liquid crystal screen **10** is turned off and the power supplied to the various components is turned off, and the stopping mode is entered (step **308**).

After the system is in the stopping mode, it determines if an external interrupt is generated (step **310**). When the external interrupt is generated, the system is turned on (step **312**) and the normal mode is resumed (step **302**). In the normal mode, the components of the system are driven as required, and a user can use the system. On the other hand, as long as no external interrupt has been applied, the stopping mode is maintained (step **308**).

The external interrupt described in conjunction with FIG. **3** may correspond to the pen interrupt which is generated when the pen **18** is pressed against the activation area. The method of processing the pen interrupt will be described with reference to FIG. **4**.

When the system is in the stopping mode, a user generates the pen interrupt by pressing the activation area of the touch screen panel **14** with the pen **18** (step **400**). When the pen interrupt is generated, the coordinate values at which the pen **18** is pressed are obtained (step **402**). Then, activation information identifying that the pen was pressed against the touch screen panel **14** and identifying the coordinate values at which the pen was pressed are provided to the controller **206** (step **404**).

FIG. **5** is a flow chart describing the manner in which the power supply **208** is controlled based on the activation information obtained from the process described in FIG. **4**. First, the controller **206** receives information (step **500**) and determines if the information is the activation information which indicates that the pen **18** has been pressed against the touch screen panel **14** during the stopping mode (step **502**). If the received information is not the activation information, the system executes another procedure (step **512**). Alternatively, the system may disregard the information and wait until the activation information is received. If the received information is the activation information, the system determines whether or not the coordinates at which the pen is pressed are within the activation area of the touch screen panel **14** (step **504**) and whether or not the pen is continuously pressed against such area (step **506**). If so, the system determines whether or not the time during which the touch screen panel **14** is pressed is longer than a predetermined time (step **508**). If the pen **18** has been pressed against the activation area for longer than the predetermined time, the system is reactivated by instructing the power supply **208** to turn on the system (step **510**). On the other hand, when the pen is not pressed against the activation area (step **504**), when the pen is not continuously pressed against the touch screen panel **14** (step **506**) or when the pen is not pressed against the activation area for the predetermined time, the process waits to receive information (step **500**).

As described above, the system is activated when the pen **18** is pressed against the activation area for a predetermined amount of time. However, the system may be alternatively activated when the pen **18** is pressed against any portion of the touch screen panel **14** for the predetermined time.

According to the present invention, a selection for activating the system can be easily made since all of the program selection area of the touch screen panel may be used as the system activation area. Also, unnecessary power

consumption can be prevented since the system is designed not to be turned on unless desired by the user because power is supplied to the system only when the activation area of the touch screen panel is pressed for more than a predetermined time.

Obviously, the embodiments described above are merely illustrative, and modifications of such embodiments may occur to those skilled in the art. Accordingly, this invention is not to be regarded as limited to the embodiments disclosed herein, but is to be limited only as defined by the appended claims.

What is claimed is:

1. A portable information terminal, comprising:

a liquid crystal screen;

a program selection screen containing icons for selecting a program to be executed, a touch screen panel having a liquid crystal screen area covering said liquid crystal screen and a program selection area covering said program selection screen; and

an activating unit which activates said portable information terminal when said portable information terminal is turned off and a position on said program selection area is pressed for a predetermined time,

wherein said activating unit further comprises:

a press position sensor which senses if said position on said program selection area is pressed and determines a location of said position on said program selection area to generate corresponding press position data;

a press timer, coupled to said press position sensor, which receives said press position data, and which determines if said position is pressed for at least a predetermined time to generate corresponding press time data; and

a controller which receives said press position data and said press time data and controls power supplied to various components of said portable information terminal such that said power is supplied only when said program selection area is pressed for at least said predetermined time.

2. A method for activating a portable information terminal having a liquid crystal screen, a program selection screen containing icons for selecting a program, and a touch screen panel having a liquid crystal screen area covering said liquid crystal screen and a program selection area covering said program selection screen, comprising the steps of:

generating an interrupt signal when a position of said program selection area of said touch screen panel is pressed and said portable information terminal is in a stopping mode;

determining said position where said program selection area is pressed and generating press information indicating that said position is pressed and indicating the location of said position when said interrupt signal is generated;

determining if said position is located within said program selection area based on said press information;

determining whether said position is pressed for longer than a predetermined time; and

supplying power to various components of said portable information terminal when said position is located within said program selection area and is pressed for longer than said predetermined time.

3. A portable information terminal, comprising:

a touch screen panel having an activation area; and

an activating unit which activates said portable information terminal when said portable information terminal is turned off and an activating position on said activation area is pressed for a predetermined time,

wherein said activating unit further comprises:

a press position sensor which senses if a panel position on touch screen panel is pressed and determines a location of said panel position on said touch screen panel to generate corresponding press position data;

a press timer, coupled to said press position sensor and determines if said panel position is pressed for at least a predetermined time to generate corresponding press time data; and

a controller, which receives said press position data and said press time data, determines if said panel position is located within said activation area based on said press position data, and controls power supplied to various components of said portable information terminal such that said power is supplied when said panel position is located within said activation area and when said activation area is pressed for at least said predetermined time.

4. The portable information terminal as claimed in claim 3, further comprising:

a liquid crystal screen;

a program selection screen containing icons for selecting a program to be executed,

wherein said touch screen panel comprises a liquid crystal screen area which overlays said liquid crystal screen and wherein said activation area of said touch screen panel overlays said program selection area.

5. The portable information terminal as claimed in claim 3, wherein said activation area constitutes substantially all of said touch screen panel.

6. The portable information terminal as claimed in claim 3, wherein said controller controls power supplied to said various components of said portable information terminal such that said power is supplied only when said panel position is located within said activation area and when said activation area is pressed for at least said predetermined time.

7. The portable information terminal as claimed in claim 3, wherein said controller prevents power from being supplied to said various components when said panel position is not continuously pressed for more than said predetermined time.

8. A method for activating a portable information terminal having a touch screen panel with an activation area, comprising the steps of:

(a) pressing a panel position of said touch screen panel when said portable information terminal is in a stopping mode;

(b) determining said panel position where said touch screen panel is pressed;

(c) generating press information indicating that said panel position is pressed and indicating a location of said panel position when said touch screen panel is pressed;

(d) determining if said panel position is located within said activation area of said touch screen panel based on said press information;

(e) determining whether said panel position is pressed for longer than a predetermined time; and

(f) supplying power to various components of said portable information terminal when said panel position is located within said activation area and is pressed for longer than said predetermined time.

9. The method as claimed in claim 8, wherein said portable information terminal comprises a liquid crystal

screen and a program selection screen containing icons for selecting a program to be executed,

wherein said touch screen panel comprises a liquid crystal screen area which overlays said liquid crystal screen, and

wherein said activation area of said touch screen panel overlays said program selection area.

10. The method as claimed in claim **8**, wherein said activation area constitutes substantially all of said touch screen panel.

11. The method as claimed in claim **8**, wherein said step (f) further comprises the step of:

(f1) supplying power to said various components of said portable information terminal only when said panel position is located within said activation area and is pressed for longer than said predetermined time.

12. The method as claimed in claim **8**, further comprising the step of:

(g) preventing power from being supplied to said various components when said panel position is not continuously pressed for more than said predetermined time.

13. A portable information terminal, comprising:

a liquid crystal screen;

a program selection screen containing icons for selecting a program to be executed,

a touch screen panel having a liquid crystal screen area covering said liquid crystal screen and a program selection area covering said program selection screen; and

an activating unit which activates said portable information terminal when said portable information terminal is turned off and a position on said program selection area is pressed for a predetermined time.

wherein said activating unit further comprises:

a press position sensor which senses if said position on said program selection area is pressed and generates corresponding press position data;

a press timer, coupled to said press position sensor, which receives said press position data, and generates corresponding press time data; and

a controller which receives said press position data and said press time data and controls power supplied to various components of said portable information terminal when said program selection area is pressed for at least said predetermined time.

* * * * *

US006476797B1

(12) **United States Patent**
Kurihara et al.

(10) **Patent No.: US 6,476,797 B1**
(45) **Date of Patent: Nov. 5, 2002**

(54) **DISPLAY**

(75) Inventors: **Mikio Kurihara**, Yamato (JP); **Satoshi Karube**, Kamakura (JP); **Eisuke Kanzaki**, Fujisawa (JP)

(73) Assignee: **International Business Machines Corporation**, Armonk, NJ (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **09/557,606**

(22) Filed: **Apr. 25, 2000**

(30) **Foreign Application Priority Data**

Apr. 27, 1999 (JP) 11-118989

(51) **Int. Cl.**[7] **G09G 5/00**
(52) **U.S. Cl.** **345/173**
(58) **Field of Search** 382/119, 124; 345/173, 175, 178, 18.01, 211, 212, 213

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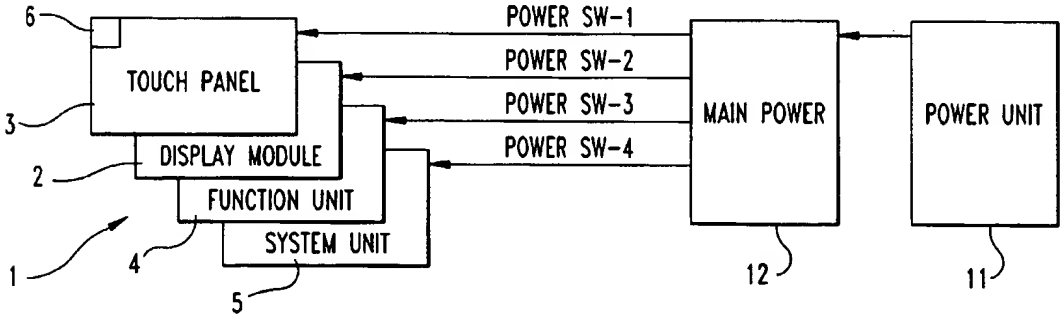
Primary Examiner—Amare Mengistu
Assistant Examiner—Tom V. Sheng
(74) *Attorney, Agent, or Firm*—Gail H. Zarick; Anne Vachon Dougherty

(57) **ABSTRACT**

A display **2** comprises a display area, and at least one touch switch region **6** formed in the display area and to be driven by an independent power supply, wherein the touch switch region **6** is operated with a predetermined input, whereby predetermined functions are controlled. Preferably, the input for controlling the predetermined function is provided by a touch of one touch switch region **6** or a simultaneous touch of a plurality of touch switch regions **6** once or a plurality of times in a predetermined order. Alternatively, the touch switch region **6** is provided with an image read function, and at the time of the predetermined input, fingerprint authentication is performed simultaneously with the touch of the touch switch region. Alternatively, a window is displayed on the touch panel simultaneously with the touch of the touch switch region, a signature is written on the displayed window, and then signature authentication is performed.

20 Claims, 5 Drawing Sheets



C3
button backGrd
Simulterious
C4
C6 add

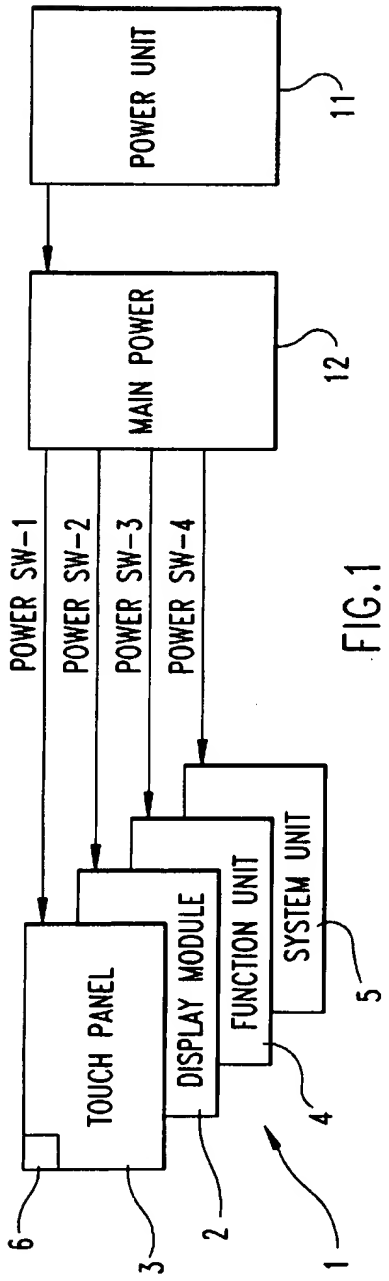


FIG.1

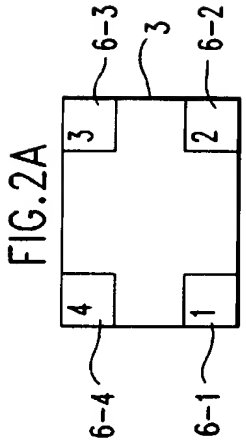


FIG.2A

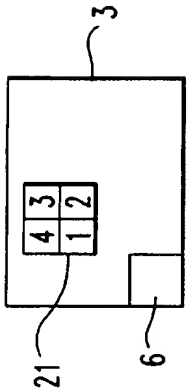


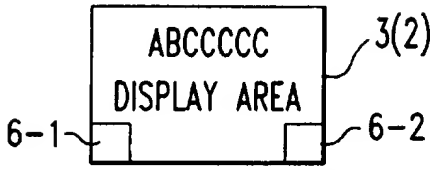
FIG.2B

FIG.2

FIG.3

NORMAL USE STATE

FIG.3A

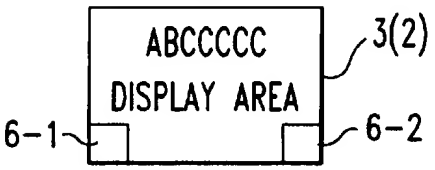


TOUCH PANEL IS ON

↓

WHEN USER DOES NOT WANT TO USE TOUCH PANEL

FIG.3B



SIMULTANEOUSLY PUSH 6-1 AND 6-2

↓

STATE IN WHICH TOUCH PANEL IS OFF

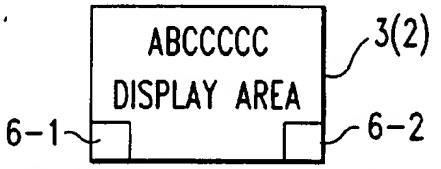
FIG.3C

TOUCH PANEL IS OFF

↓

WHEN USER WANTS TO USE TOUCH FUNCTION

FIG.3D



SIMULTANEOUSLY PUSH 6-1 AND 6-2

↓

STATE IN WHICH TOUCH PANEL IS ON

FIG.3E

TOUCH PANEL IS ON

FIG.4

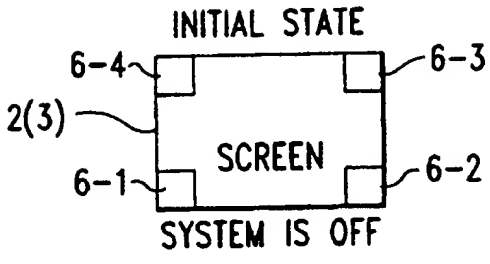


FIG.4A

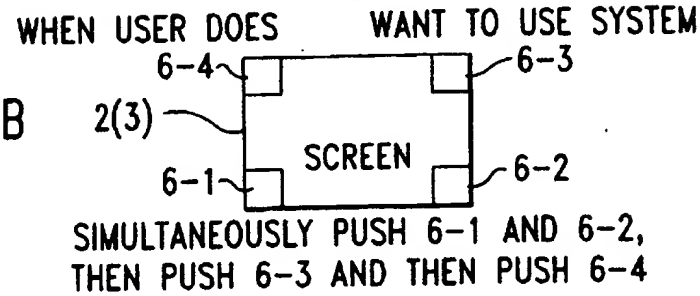


FIG.4B

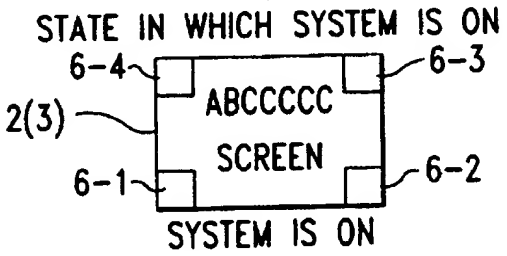


FIG.4C

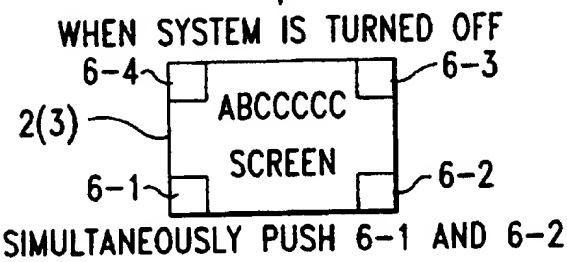


FIG.4D

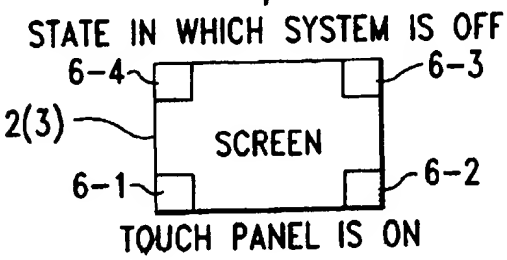


FIG.4E

FIG.5A

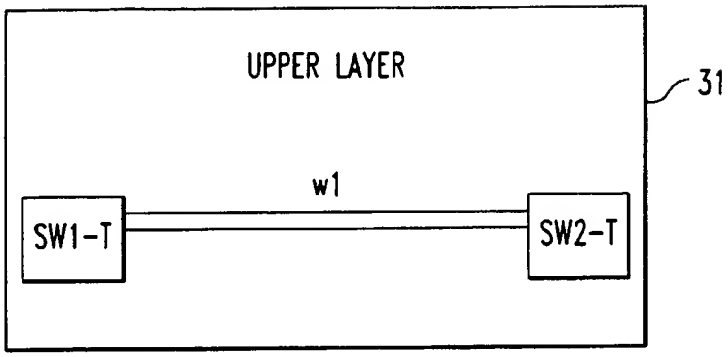


FIG.5B

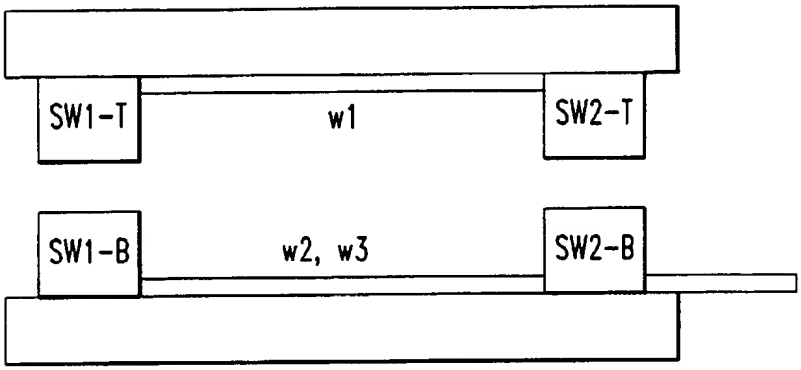


FIG.5C

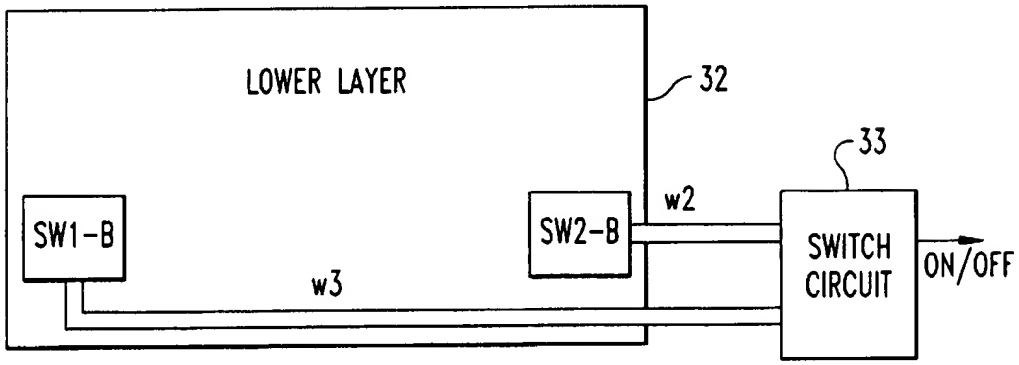


FIG.5

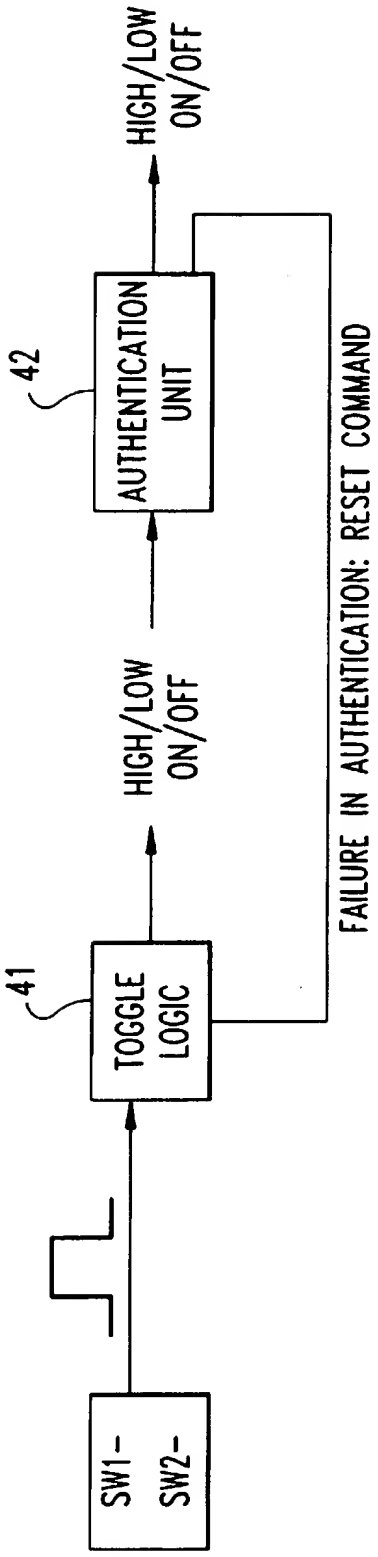

HIGH/LOW
ON/OFF
42
AUTHENTICATION
UNIT
HIGH/LOW
ON/OFF
FAILURE IN AUTHENTICATION: RESET COMMAND
41
TOGGLE
LOGIC
SW1-
SW2-

FIG.6

DISPLAY

FIELD OF THE INVENTION

The present invention relates to a display including a display module such as an LCD (Liquid Crystal Display) or a CRT (Cathode-Ray Tube) and more particularly to a display capable of controlling various functions by operating a display area of the display.

BACKGROUND OF THE INVENTION

Various displays including the display module such as the LCD or the CRT have been heretofore known. Various displays having an input function using a touch panel overlaid on the display area of the display module have been also known. Such a display controls the function of turning on or off a main power switch, for example, in the following manner. The switch displayed on the display area of the display module is clicked and pointed at with a pointing device. The display including the touch panel controls the functions in the following manner. The switch displayed on the touch panel is pointed at with a touch of the finger or the like.

The above-described control of the functions cannot be executed when a power supply of the display module or the touch panel is not on. It is thus necessary to always keep the power supply of the display module or the touch panel on. Power consumption is therefore increased. Especially when the display is used for a mobile terminal such as a notebook PC, available time is reduced proportional to the time period for which the display is carried. The available time is extremely important for the use in the mobile terminal. A serious problem is that the available time is thus reduced. Moreover, a recent requirement is that the power consumption while in standby mode be reduced to a minimum level or to zero from an environmental standpoint.

Various techniques are known in order to solve the above-described problem of the available time, i.e., the problem of power saving. One technique is disclosed in Japanese Unexamined Patent Publication No. 63-276085 in which a proximity sensor is provided on the touch panel. In the system disclosed in that publication, the power supply of the touch panel is turned on when a person approaches the sensor for the purpose of operation or the like and thus the proximity sensor generates a sense signal. Conversely, the power supply of the touch panel is turned off when a sense signal is not generated. Another technique is disclosed in Japanese Examined Patent Publication No. 3-19566 in which a push button switch is provided on the touch panel. Under that system, the push button switch is turned on by touching the touch panel with the finger or the like; and, the touch panel is turned on only at this time, whereby the power consumption is reduced.

However, the above-mentioned techniques cannot fully achieve the desired power saving. Thus, a problem exists whereby it is impossible to provide a display which is capable of achieving the sufficient power saving that is increasingly required and which is capable of increasing the available time of the display. Another problem which exists is that, even if the power saving can be achieved to some extent, the problem of security is not considered at all when the function is executed. Thus, even an ill-intentioned third party can easily perform the on-off control of the display under the prior art systems.

It is, therefore, an object of the present invention to provide a display which can achieve functions such as power saving for various units by a simple constitution and which can also maintain security.

SUMMARY OF THE INVENTION

The foregoing and other objects are realized by the present invention for use with a display including a display module such as an LCD or a CRT, and preferably for a display having an input function using a touch panel overlaid on a display area. The display comprises a display area and at least one touch switch region formed in the display area, which touch switch region is driven by an independent power supply. Preferably, the touch switch region may be formed by providing a small touch panel at a predetermined position of the display area of the display. In the display including the touch panel, preferably the touch switch region may be formed by overlaying another touch panel on a surface of the main touch panel, or by separating a part of the touch panel from the main touch panel. Then, the touch switch region is operated with a predetermined input, whereby predetermined functions are controlled.

When not much consideration is given to security, the predetermined input can be provided simply by touching one touch switch region. When security is a consideration, however, the predetermined input can be provided by a touch of one specific touch switch region, or by simultaneous touching of a plurality of touch switch regions once or a plurality of times in a predetermined order. Moreover, the touch switch region is provided with an image read function and, at the time of the predetermined input, fingerprint authentication can be performed simultaneously with the touch of the touch switch region. Alternatively, a window is displayed on the touch panel simultaneously with the touch of the touch switch region, a signature is written on the displayed window, and then signature authentication can be performed.

Furthermore, predetermined functions to be controlled include on-off control of a main power switch, on-off control of a display module of the display, on-off control of a function unit, on-off control of a system unit, or on-off control of the touch panel if the display has the touch panel. The function unit is a fingerprint authentication unit or a signature authentication unit. The system unit is a system power switch or a system suspend/resume switch.

In the present invention, normally, at least one touch switch region which is alone to be driven by the independent power supply can be always kept driven, and the power supplies of all the other functions can be kept off. Only when a user wants to control a predetermined function is the power supply of a predetermined function turned on and controlled with the touch of the touch switch region. Therefore, sufficient power saving can be achieved. Moreover, (1) the input for controlling a predetermined function is provided by the touch of one touch switch region or the simultaneous touch of a plurality of touch switch regions once or a plurality of times in a predetermined order; (2) the touch switch region is provided with the image read function, and at the time of a predetermined input operation, fingerprint authentication is performed simultaneously with the touch of the touch switch region; or (3) the window is displayed on the touch panel simultaneously with the touch of the touch switch region, the signature is written on the displayed window, and signature authentication is performed. Due to any one of the above (1) to (3), a third party who does not know an input order or has an unauthorized fingerprint or signature cannot use the function. Thus, security can be maintained.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will now be described in greater detail with specific reference to the appended drawings wherein:

FIG. 1 is a schematic illustration of a system of one example of a display of the present invention;

FIGS. 2A and 2B show constitutions of examples of a touch switch region of the display of the present invention;

FIGS. 3A to 3E show the states of a panel power saving function of the present invention;

FIGS. 4A to 4E show the states of a combination key switch of a security function of the present invention;

FIGS. 5A, 5B and 5C are a top view, a side view and a bottom view, respectively, of the constitution of one example of the touch switch region formed on the surface of a display module or a touch panel, respectively; and

FIG. 6 shows the example of switching of the touch switch region using a switch which needs to be powered.

DETAILED DESCRIPTION OF THE INVENTION

FIG. 1 is a schematic illustration of a system of one example of a display of the present invention. In the example shown in FIG. 1, numeral 1 denotes the display, numeral 11 denotes a power unit, and numeral 12 denotes a main power switch SW-0. The display 1 includes a display module 2 and a touch panel 3 overlaid on a display area of the display module 2, thereby having an input function using the touch panel. The display 1 also includes a function unit 4 and a system unit 5. In this example, a different transparent touch panel (not shown) from the touch panel 3 is overlaid on a predetermined position of the touch panel 3, whereby at least one touch switch region 6 to be driven by an independent power supply is formed in the display area of the display 1, i.e., the display area of the touch panel 3 (it is here assumed that one touch switch region is located at an upper left corner). Functions of the function unit 4 include a fingerprint authentication function and a signature authentication function as described below. Functions of the system unit 5 include a system power switch function and a system suspend/resume switch function.

In the example shown in FIG. 1, the display of the present invention is characterized by that the touch switch region 6 is operated with a predetermined input as described below, whereby the display executes the on-off control of the switch SW-0 of the main power switch 12, the on-off control of a power switch SW-1 from the power unit 11 to the touch panel 3, the on-off control of a power switch SW-2 from the power unit 11 to the display module 2, the on-off control of a power switch SW-3 from the power unit 11 to the function unit 4, or the on-off control of a power switch SW-4 from the power unit 11 to the system unit 5. In this case, the power for driving the touch switch region 6 is always supplied to the touch switch region 6. Moreover, users individually set an input operation.

FIGS. 2A and 2B show constitutions of examples of the touch switch region 6 of the display of the present invention. In the example shown in FIG. 2A, touch switch regions 6-1 to 6-4 are located at four corners of the display area of the touch panel 3. In this example, the input operation is performed in the following manner. The user previously memorizes the positions of the invisible touch switch regions 6-1 to 6-4, and the user touches the touch switch regions 6-1 to 6-4 in a predetermined order with his/her fingertip, for example. In the example shown in FIG. 2B, the touch switch region 6 is located at a lower left corner of the display area of the touch panel 3. In this example, the input operation is performed in the following manner. The user previously memorizes the position of the invisible touch switch region 6. Then, the user touches the touch switch region 6 with his/her fingertip, for example, whereby a visible keying section 21 (here, four numbers, i.e., 1 to 4) is displayed near the center of the touch panel 3 by the display module 2. Then, the user touches the numbers of the keying section 21 with his/her fingertip, for instance. The description of FIG. 1 gives the example that the touch switch region 6 is formed by overlaying a different touch panel from the touch panel 3 on a predetermined position of the touch panel 3. However, the touch switch region 6 can be also formed by separating a part of the touch panel 3 from the touch panel 3 at the time of making of the touch panel 3.

Next, the functions which can be carried out by the display of the present invention, i.e., a power saving function for the touch panel 3 and the display module 2, a security function, a system switch function and an S/W key function will be described in order.

1) Panel Power Saving Function

To save the power when the touch panel 3 and/or the display module 2 are/is not in use, the power switch SW-1 to the touch panel 3 and/or the power switch SW-2 to the display module 2 shown in FIG. 1 are/is repeatedly turned on and off only when the touch switch regions 6-1 and 6-2 of the example shown in FIG. 2A are simultaneously touched and pushed, for example. Thus, the power saving for the touch panel 3 and/or the display module 2 can be executed.

2) Security Function

To prevent others from using the system without authorization, the switch for confirming the identity of the user is used by the following method. The power switch is turned on only when the user is identified as an authorized user.

1. Combination Key Switch

Example: The switch is turned on when a combination of key touches (a series of touches and a simultaneous touch, at the push position in the touch switch region matches a proper combination.

Example: The switch is turned on when a time interval (like Morse code) at the push position in the touch switch region matches a proper time interval.

2. Fingerprint Authentication Switch

Example: The switch is turned on when the fingerprint at the push position in the touch switch region matches the fingerprint of the authorized user. In this case, it is necessary to provide the touch switch region with an image read function and to provide the push position with a fingerprint reader.

3. Signature Authentication Switch

Example: The switch is turned on when the push position in the touch switch region is touched and a signature matches an authentic signature. In this case, it is necessary to provide the touch switch region or the touch panel with the image read function and to temporarily display a signature input area on the push position or a display screen.

3) System Switch Function

This function is used for the following applications in place of the switch which has been heretofore provided by the system.

1. System Power Switch

Example: The switch is repeatedly turned on and off only when two touch switch regions are simultaneously touched and pushed.

Example: This switch is combined with the security function.

2. System Suspend/Resume Switch

Example: The switch is repeatedly turned on and off only when two touch switch regions are simultaneously touched and pushed.

Example: This switch is combined with the security function.

4) S/W Key Function

This function is used in place of a command menu which has been heretofore provided by the S/W.

1. Shut Down Switch

Example: The system is shut down only when two touch switch regions are simultaneously pushed.

Next, the panel power saving function and the security function of the above-described functions will be described by taking an example of a state of an actual operation with reference to FIGS. **3** and **4**. FIGS. **3**A to **3**E show the states of the panel power saving function. It is assumed that the touch switch regions **6-1** and **6-2** are located at two corners, i.e., the lower left corner and the lower right corner of the display area of the touch panel **3**, respectively. FIG. **3**A shows a normal use state. In this state, both of the display module **2** and the touch panel **3** are on. FIG. **3**B shows the operation which is performed when the user does not want to use the function of the touch panel **3**. In this case, two touch switch regions **6-1** and **6-2** are simultaneously touched, whereby the touch panel **3** is turned off. FIG. **3**C shows a state in which the touch panel **3** is off. In this state, the display module **2** is on and only the touch panel **3** is off. Two touch switch regions **6-1** and **6-2** are always on. FIG. **3**D shows the operation which is performed when the user wants to use the function of the touch panel **3**. In this case, two touch switch regions **6-1** and **6-2** are again simultaneously touched, whereby the touch panel **3** is turned on. FIG. **3**E shows a state in which the touch panel **3** is on. In this state, both of the display module **2** and the touch panel **3** are on. The following constitution can be also employed in order to further save the power. Not two touch switch regions but only one touch switch region is powered on, so that as soon as one on-state touch switch region is touched, the other touch switch region is turned on.

FIGS. **4**A to **4**E show the states of the combination key switch of the security function. It is assumed that the touch switch region **6** is located at each of four corners of the display area of the touch panel **3**. FIG. **4**A shows an initial state. In this state, the system is off. Also in this state, four touch switch regions **6-1** to **6-4** are on. The following constitution may be also employed in order to further save the power. At substantially the same time when one touch switch region is touched, the other three touch switch regions are turned on. FIG. **4**B shows the operation which is performed when the user wants to use the system. In this case, the display module **2** and the touch panel **3** are turned on by a series of combination key switch operations. Here, a series of combination key switch operations is that first the two lower left and lower right touch switch regions **6-1** and **6-2** are simultaneously touched,then the upper right touch switch region **6-3** is touched, and then the upper left touch switch region **6-4** is touched. FIG. **4**C shows a state in which the system is on. In this state, both of the display module **2** and the touch panel **3** are on. FIG. **4**D shows the operation which is performed to turn off the system. In this case, the two lower left and lower right touch switch regions **6-1** and **6-2** are simultaneously touched, whereby the system, namely, the display module **2** and the touch panel **3** are turned off. FIG. **4**E shows a state in which the system is off. In this state, the system, i.e., the display module **2** and the touch panel **3** are off. Of course, also in this state, four touch switch regions **6-1** to **6-4** are on. The following constitution may be also employed in order to further reduce power consumption. Only one touch switch region is kept on so that at substantially the same time when one touch switch region is touched, the other three touch switch regions are turned on.

Next, a method of forming the invisible touch switch region **6** (**6-1** to **6-4**) will be described with reference to FIGS. **5** and **6**. (1) Overlaying another touch panel on the surface of the display module **2** or the surface of the touch panel **3** located on the surface of the display module **2**, or (2) separating a part of the touch panel from the main touch panel **3** located on the surface of the display module **2** is suitably used as the method of forming the touch switch region **6** to be driven by the independent power supply for use in the present invention.

FIGS. **5**A, **5**B and **5**C are a top view, a side view and a bottom view of the constitution of one example of the touch switch region **6** formed on the surface of the display module **2** or the touch panel **3** in the above-mentioned case (1), respectively. In the example shown in FIGS. **5**A to **5**C, two protruding transparent electrodes SW1-T and SW2-T and a transparent wiring w1 for connecting the transparent electrodes SW1-T and SW2-T are provided on an upper layer, **31** shown in FIG. **5**A. Two protruding transparent electrodes SW1-B and SW2-B corresponding to the transparent electrodes SW1-T and SW2-T, respectively, are located on a lower layer **32** shown in FIG. **5**C so that the transparent electrodes SW1-B and SW2-B may face each other at a fixed distance from each other, whereby the touch switch region **6** is formed. In this state, the upper layer **31** is touched and pushed with the fingertip or the like, whereby the transparent electrode SW1-T is brought into contact with the transparent electrode SW1-B and simultaneously the transparent electrode SW2-T is brought into contact with the transparent electrode SW2-B. Thus, the state of a switch circuit **33** is changed from on to off or from off to on.

Next, a fingerprint authentication switch function and a signature authentication switch function of the security function will be described. In order to carry out the fingerprint authentication switch function, it is necessary to provide the touch switch region **6** with the image read function. First, a predetermined touch switch region **6** is touched with the fingertip by a predetermined method, whereby a fingerprint authentication unit is turned on. Simultaneously, the fingerprint on the touch switch region **6** which is being touched is read, and the fingerprint authentication unit performs authentication to see whether or not the read fingerprint matches the previously registered fingerprint of an authorized user. When the result of authentication shows a fingerprint match, the system switch is turned on at this point of time. On the other hand, when the result of authentication shows a fingerprint mismatch, the fingerprint authentication switch is turned off and the switch provides for next switching.

In order to carry out the signature authentication switch function, it is necessary to provide the touch switch region **6** or the touch panel **3** with an image read function. First, a predetermined touch switch region **6** is touched with the fingertip or the like by a predetermined method, whereby a signature authentication unit, the display module **2**, and the touch panel **3** are turned on. Simultaneously, a signature input section is displayed on the display module **2**. Then, the signature inputted to the signature input section is read, and the signature authentication unit performs authentication to see whether or not the read signature matches the previously registered signature of an authorized user. When the result of authentication shows a signature match, the system switch is turned on at this point of time. On the other hand, when the result of authentication shows a signature mismatch, the signature authentication switch is turned off and the switch provides for next switching.

Next, one specific example of switching of the touch switch region **6** will be described with reference to FIG. **6**.

In the example shown in FIG. 6, switches SW1 and SW2 are turned on with the touch of two touch switch regions 6, whereby a pulse is generated and thus a toggle logic 41 is changed from on to off or from off to on. Thus, various types of authentication units 42 are turned on. When authentication ends normally, a command to change the switch from on to off or from off to on is given. When authentication does not end normally, the switch is reset. The above-described method is only one example, and the use of various types of switches allows various methods.

As is apparent from the above description, according to the present invention, at least one touch switch region alone to be driven by the independent power supply can be always kept driven, and the power supplies of all the other functions can be kept off. Only when the user wants to control a predetermined function is the power supply of a predetermined function turned on and controlled with the touch of the touch switch region. Therefore, sufficient power saving can be achieved. Moreover, (1) the input for controlling a predetermined function is provided by the touch of one touch switch region or the simultaneous touch of a plurality of touch switch regions once or a plurality of times in a predetermined order; (2) the touch switch region is provided with the image read function, and at the time of a predetermined input operation, fingerprint authentication is performed simultaneously with the touch of the touch switch region; or (3) a window is displayed on the touch panel simultaneously with the touch of the touch switch region, the signature is written on the displayed window, and signature authentication is performed. Due to any one of the above (1) to (3), a third party who does not know an input order or has different fingerprint or signature cannot use the function. Thus, security can be maintained.

Having thus described the invention, it is desired to secure a Letters Patent on the following:

1. A display for a computing device having a computing device power supply and a plurality of functions comprising:

a display area;

at least one touch switch region formed in said display area and being responsive to a predetermined input; and

at least one independent touch switch power supply connected to drive that at least one touch switch region independent of said computing device power supply, whereby power is supplied to said computing device and access granted to selected ones of said plurality of computing device functions only upon receipt of predetermined input at said at least one touch switch region.

2. The display according to claim 1, further comprising a first touch panel overlaid on said display area, whereby said display has an input function using said touch panel.

3. The display according to claim 2, wherein said at least one touch switch region is formed by overlaying a second touch panel on a surface of said display.

4. The display according to claim 2, wherein said touch switch region is provided with the image read function, and at the time of said predetermined input, a window is displayed on said touch panel simultaneously with the touch of said touch switch region, then a signature is written on said displayed window, and then signature authentication is performed.

5. The display according to claim 1, wherein said at least one touch switch region is formed by overlaying a first touch panel on a surface of said display.

6. The display according to claim 1, wherein said at least one touch switch region comprises four touch screen regions located at four corners of said display area of said display.

7. The display according to claim 1, wherein said predetermined input is provided by a touch of one of the at least one touch switch region.

8. The display according to claim 1, wherein said at least one touch switch region comprises a plurality of touch switch regions and wherein said predetermined input is provided by simultaneous touching of a plurality of the touch switch regions.

9. The display according to claim 1, wherein said at least one touch switch region comprises a plurality of touch switch regions and wherein said predetermined input is provided by touching a plurality of the touch switch regions a plurality of times in a predetermined order.

10. The display according to claim 1, wherein said predetermined input is provided by displaying a keying section on said touch panel with the touch of said touch switch region and then touching numbers of said keying section.

11. The display according to claim 1, wherein said touch switch region is provided with an image read function, and at the time of said predetermined input, fingerprint authentication is performed simultaneously with the touch of said touch switch region.

12. The display according to claim 1, wherein predetermined functions to be controlled include at least one of the group consisting of on-off control of a main power switch, on-off control of a display module of said display, on-off control of a function unit, on-off control of a system unit, or on-off control of said touch panel if said display has said touch panel.

13. The display according to claim 12, wherein said function unit is at least one of a fingerprint authentication unit and a signature authentication unit.

14. The display according to claim 12, wherein said system unit is one of a system power switch and a system suspend/resume switch.

15. A method for providing selective access to control at least one function of a computer having a display, a computing device power supply and a plurality of functions comprising the steps of:

providing at least one touch screen region in said display, said at least one touch screen region being driven by at least one independent touch screen power source which is independent from the computing device power supply and being responsive to predetermined input;

receiving input to the at least one touch screen region in said display; and

providing access to control functions of the computer, whereby power is supplied to said computing device and access granted to selected ones of said plurality of functions only upon receipt of predetermined input to said at least one touch screen region.

16. The method according to claim 15 further comprising analyzing said input prior to providing access.

17. The method according to claim 16 wherein said analyzing comprises analyzing the fingerprint input to the at least one touch screen and comparing the fingerprint input to that of at least one authorized user.

18. The method according to claim 16 further comprising receiving signature input to the display and wherein said analyzing comprises comparing the signature input to that of at least one authorized user.

19. The method of according to claim 15 wherein said providing comprises overlaying at least one touch screen having at least one touch switch region on the display.

20. A program storage device readable by machine, tangibly embodying a program of instructions executable by the machine to perform the method steps for providing selective access to control at least one function of a computer having a display, a computing device power supply and a plurality of functions with at least one touch screen region in said

display, said at least one touch screen region being driven by at least one independent touch screen power source, which is independent from the computing device power supply, and being responsive to predetermined input, the method comprising the steps of:

receiving input to the at least one touch screen region in said display; and

providing access to control functions of the computer, whereby power is supplied to said computing device and access granted to selected ones of said plurality of functions only upon receipt of predetermined input to said at least one touch screen region.

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Lundqvist

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(54) **PORTABLE TELEPHONE**

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(58) **Field of Search** 455/575, 90, 566, 455/128, 351, 572, 550, 127; 379/428.01, 428.03, 433.04; 345/169, 173, 174

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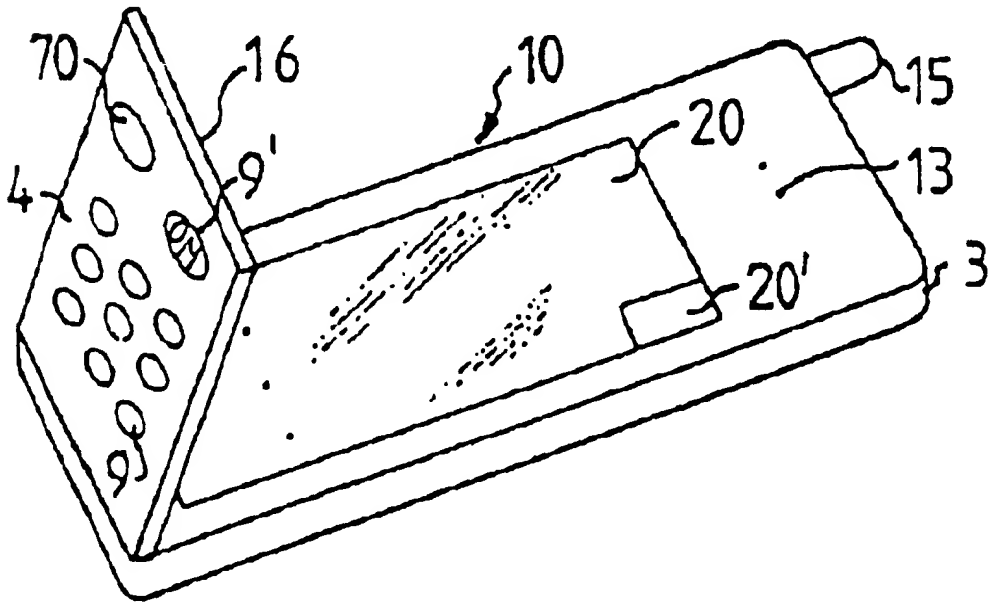
(57) **ABSTRACT**

The present invention relates to a portable telephone, which can be switched on/off by using the touch screen **(20)** of the portable telephone **(10)**

12 Claims, 2 Drawing Sheets



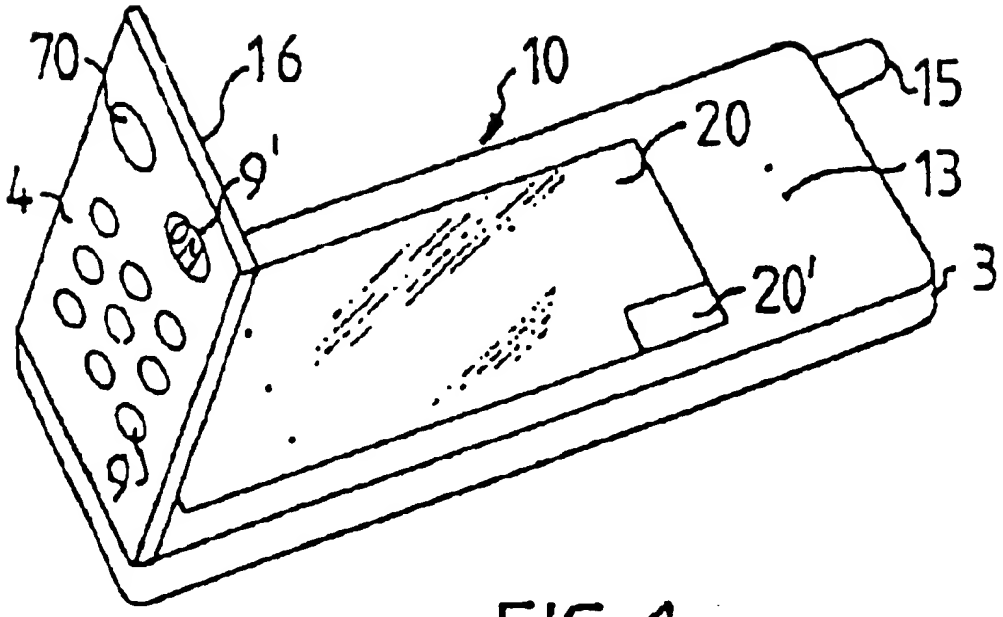


FIG. 1

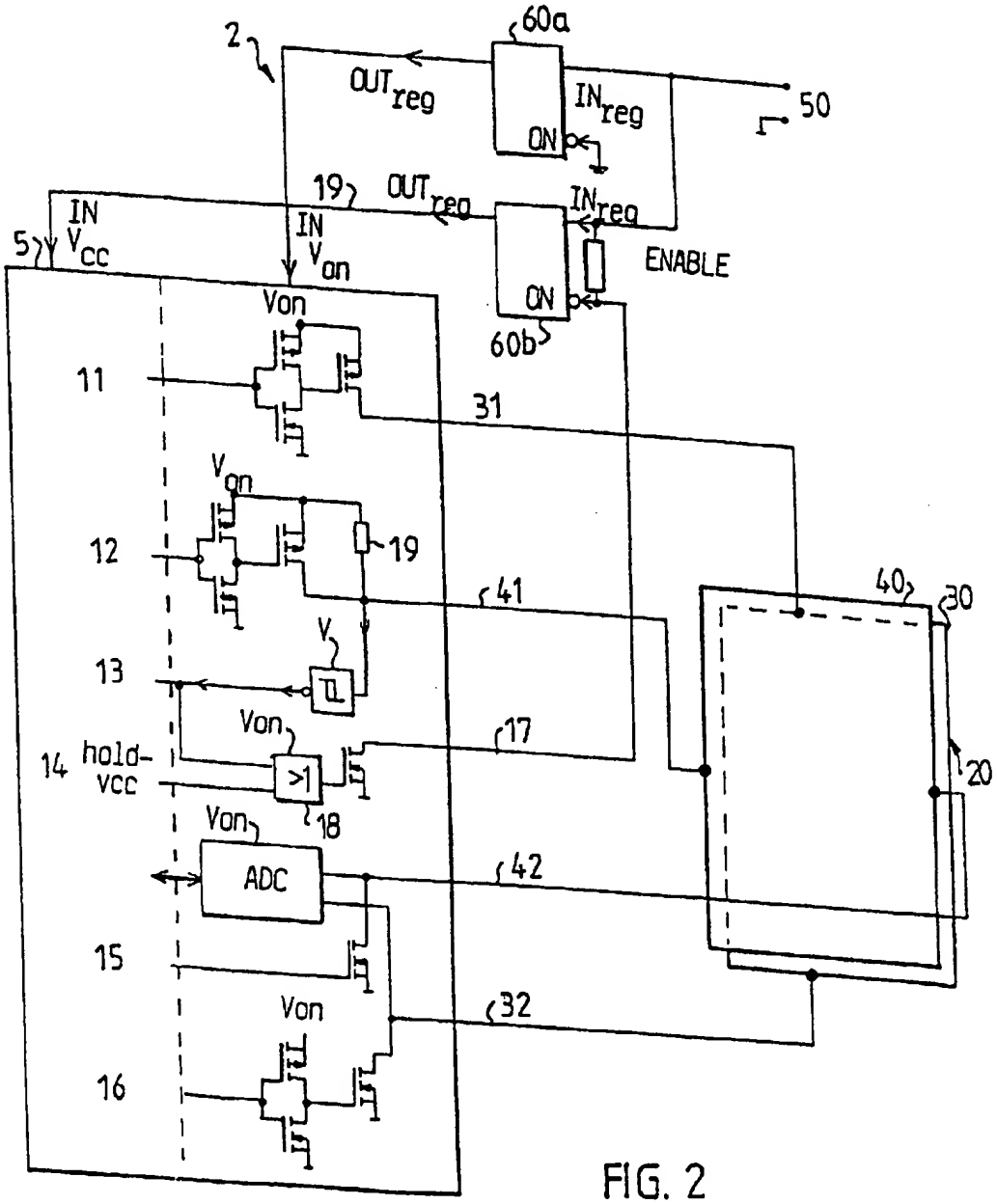

2
60a
OUT reg
IN reg
50
ON
19
OUT reg
IN reg
IN
V cc
IN
V on
ENABLE
5
Von
ON
60b
11
31
V on
12
19
41
40
30
V
13
Von
17
14
hold-
vcc
>1
18
20
Von
ADC
42
15
Von
32
16

FIG. 2

PORTABLE TELEPHONE

BACKGROUND

The present invention relates to controlling the supply of power to a portable communication device of the type mentioned in the preamble of the independent claims.

Many portable communication devices, such as mobile telephones, personal communicators etc, normally require a "hardware power on system" for powering on. A "hardware power on system" is referred to as a system, which comprises a physical switch, controlling the power on of the portable communication device.

Other portable communication devices have a hinged front panel, a so-called a flip, which can be opened when the device is used for certain functions and which can be closed in order to reduce the bulk of the device when these functions are not required.

One example of such a device is the mobile telephone known from the patent GB-A-2 297 661 which has a flip which can be folded down to expose a touch screen display. When the flip is folded up against the touch screen display the screen can be operated by means of a keypad consisting of a plurality of buttons which extend through the flip and which can be pressed by a user into contact with the touch sensitive parts of the touch screen display. There is a flip position-indicating switch in the main body of the unit which can be operated by a switch activation device disposed in the flip. The flip position indicating switch and switch activation device co-operate to produce a mode change signal which is sent to the processor of the mobile phone and which indicates if the flip is open or closed. If the flip is closed a first set of functions is available to the user and if the flip is open a second set of functions is available to the user. Cellular telephones of this type can be switched on and off by a hardware switch which disconnects tie processor from the logic voltage supply in order to minimise unnecessary battery drainage caused by the logic voltage supply leakage current.

Thus a separate hardware switch is required which increases the manufacturing costs and, as it introduces a potential failure path, and also lowers the reliability of the mobile telephone.

It is also known to use "soft power control" for instance in personal computer systems, to be able to save power and extend battery lifetime. This is ordinarily done by the operator of the computer system powering on not using a "hard power on switch". "Soft power control" in such a computer system normally comprise several power control modes, such as a "full power mode" and a sleep mode. In the "full power mode", the main parts of the computer system are supplied with power and are active. In the "sleep mode", one or more parts of the computer system are not supplied with power and are said to be inactive. In the "sleep mode", the operator depresses a key on the keyboard to power on the main parts of the computer system.

It is known from U.S. Pat. No. 5,553,296 to use a touch screen for a power control function in a computer system, whereby the touch screen is employed to control a number of power modes, such as "full power mode" and "sleep mode" in the computer system. The touch screen detects a touch input by the operator from the touch screen. If the computer system is in a power down mode, a so-called "sleep mode", the touch screen provides a main power on signal after the touch is detected.

U.S. Pat. No. 4,825,209 describes a remote control apparatus, which puts a transmitting portion, a receiving portion and an image display control portion thereof in an enabled state for a predetermined period of time after a touch panel is pressed to reduce power consumption. The press detection is done with push button switches in the corners of a remote control.

JP-A-8-212 006 describes switching on a flat panel indicator if any touch input is sensed. When there is no touch input for a predetermined time period, the flat panel is switched off.

One problem is that prior art portable communication devices, such as a mobile phone comprising a touch screen display, such as a touch screen LCD (Liquid Crystal Display), require additional mechanical on-off switches positioned at different locations, whereby the way to power up differs from device to device, even for similar devices of the same family.

Another problem is that these switches require space to be implemented in the portable communication devices.

Yet another problem is that today's portable communication devices, in particular portable telephones comprising a flip hang, must be provided with wires through the flip hinge if a hardware power on-off switch is provided thereon.

SUMMARY

The object of the invention is to solve the described problems and provide an improved portable telephone, in which the use of a separate hardware switch to switch on the device is unnecessary. Herein, portable telephones means: mobile telephones, cordless telephones and personal communicators.

Another object of the present invention is to improve the reliability of such a portable telephone and to reduce their manufacturing costs.

This is attained according to the present invention by means of a portable telephone in which the touch screen display is used for switching on the device, wherein a hardware switch is unnecessary. The touch screen display comprises at least one inner and one outer essentially transparent conducting plate which are movable in relation to each other between a first position, in which the plates are spaced apart and a second position, in which the plates are contacted to each other by the outer plate being depressed by a user of the portable telephone by means of an input means, such as a key pad or direct activation providing a pressure against the touch screen display, wherein a voltage controlled switch connected to said plates is adapted to turn on the power of the portable telephone upon receipt of a signal indicating that a power-on key has been depressed by the user.

An advantage of the present invention is that the invention simplifies the use of a portable telephone, compared to known technique.

Another advantage of the present invention is that no additional switch must be incorporated in the portable telephone. It is possible to use the image display of a portable telephone, independent on model for powering on.

The invention will now be described in more detail with reference to preferred embodiments and to the appended drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 shows a perspective view of a portable telephone, according to the invention, comprising a touch screen display for controlling the supply of power to the portable telephone.

FIG. 2 shows a schematically block diagram of the touch screen display and the voltage controlled switch in a portable telephone according to the invention.

DETAILED DESCRIPTION

FIG. 1 shows a perspective view of a portable telephone **10**, provided with a touch screen display **20** for displaying information such as telephone number, signal strength, battery level, roaming information etc, and intended for receiving commands from the user, in a conventional way as well as the power-on function. The portable telephone **10** has a main body **3**, comprising a loudspeaker **13**, an antenna **15**, a microphone **16**, and a flip **4** movable in relation to the main body, which can be folded up against the main body **3**. The flip **4** has input means **70** for example a keypad with a plurality of keys **9**, which each correspond to a desired function. The function of each key **9** is determined by the software of the portable telephone **10**. The touch screen display **20** detects which key **9** has been pushed and carries out the desired function. Activating the power-on key **9'** causes the touch screen display **20** to register that the key **9'** has been pushed and causes a voltage controlled switch **2'** (see FIG. 2) to connect the power supply **50** (not shown).

FIG. **2** is a schematically block diagram of an embodiment of the touch screen display **20** connected to the voltage controlled switch **2** for connecting and disconnecting the power supply **50** such as a battery to the portable telephone **10**. The power supply **50** is connected to the input terminal IN_{reg} of a first voltage regulator **60***a*, which can provide a fixed logic voltage supply Von on an output terminal OUT_{reg}. The voltage regulator **60***a* is always enabled to provide the high input voltage Von to the control means **5** on its input terminal IN_{Von}. The power supply **50** is also connected to the input terminal IN_{reg} of a second voltage regulator **60***b*, which can provide a logic voltage supply Vcc on its output terminal OUT_{reg}. The voltage regulator **60***b* is enabled to provide the logic voltage supply Vcc to the control means **5** on its input terminal IN_{Vcc}, when it receives a high input voltage on its ENABLE terminal. This causes the control means **5** to start its logic, which controls the power-on function. The logic is of conventional type for controlling a touch screen display also of conventional type and the function thereof will not be described in more detail The logic comprises at least a main microprocessor, as well as other control circuits of known technologies.

The way of applying a high input voltage to the ENABLE terminal of regulator **60***b*, which thereby allows the power supply to be connected to the input terminal IN_{Vcc} of the control means **5**, to power-on the device will now be described in more detail.

The touch screen display **20** comprises at least two plates, one inner plate **30** and one outer plate **40** spaced apart, which are connected via four signal lines **31**, **32**, **41**, **42** to the terminals of the control means **5** in a conventional way. The outer plate **40**, intended to be depressed by a user, is preferably connected via signal line **41** provided with a pull-up resistor **19** and the inner plate **30** is connected to ground when the mobile is powered down. When the portable telephone is powered. down, Vcc is OV (low) and Von, for instance 5 V (high), All signals on the output terminals **11–16** and **18** of the control means **5** are then low. Thus, in this mode one of the plates **40** has high potential and the other plate **30** has low potential.

Now referring to FIG. **1**, when the user depresses a power-on key on the input means **70** provided on the touch screen display **20**, the plate **40** that is connected via the pull up resistor **19** will be forced to ground, whereby the signal in signal line **41** will go low. A signal will be sent via signal line **17** to the ENABLE terminal of regulator **60***b*, which will provide an enabling current, or in other words, a high potential, to the terminal IN_{Vcc}. of the control means **5**, thereby starting its logic to obtain a power-on function. The control means **5** will after it has set "hold_Vcc" on its terminal **14**, start to interpret the meaning of the activation, starting with detecting the touch position in a conventional way.

One or more keys **9** of the keypad **70** can be assigned a power-on function by the software of the control means **5**.

If it were not on the "on button position", "hold_Vcc" on signal line **14** is released again and the portable telephone will power down again, provided that the pressure on touch screen display **20** is released, otherwise the portable telephone will stay on.

In this way switching on of the portable telephone is obtained without requiring any special on hardware switch.

For one embodiment the touch screen display comprises a resistive type of touch screen display, but is not limited thereto. The resistive touch screen display comprises two sheets of clear material, which is conducting.

The time period between performing the power-on function will vary depending on application. Thus, the touch screen display must be depressed for a predetermined period of time before performing. the power on command This prevents accidental power on from an inadvertent touching of the screen.

In alternative embodiments, a plurality of power on modes may exist between the fill power up and the full power down mode.

Shutting down the portable telephone is performed in a conventional way. One of the keys in the input means **70** can be assigned an "off" function by the software of the control means.

The input means is for instance a movable housing element, such as a flip, comprising a push-through keyboard. It is also possible to use direct activation providing a pressure against the touch screen display **20**, whereby the touch screen display can comprise a user data area (**20'**) divided into multiple sub-areas corresponding to the keys of the keypad.

While the invention has been illustrated by a portable telephone with a flip, it is also possible to use other arrangements of keypads, for instance of sliding type.

The voltage regulator **60***a* which is always enabled to provide a high input voltage to the control means **5** can be substituted by any other connection means, provided that the components in the control means **5** are not destroyed.

The voltage regulator **60***b* can be substituted by any other voltage-controlled switch.

A "pull down" solution is also possible.

While the advantages of the invention are most fully realised when no separate hardware switch is used to switch the processor on and off, it is also possible to provide the portable telephone with a separate hardware switch if so desired in order to control the power supply to some other component of the portable telephone, as well as the processor.

What is claimed is:

1. A method for controlling connection of a power supply in a portable telephone having a touch screen display for powering-on the telephone, said touch screen controlled by a touch screen controller and being divided into at least a

power-on section and a second section, and user-operable input means which can order a voltage controlled switch connected to said touch screen display to turn on the power of the portable telephone, the method comprising the steps of:

sensing if the touch screen display has been depressed by a user of the portable telephone, and if It has been depressed, enabling a voltage controlled switch by a signal originating from the touch screen display in order to turn on the power of the portable telephone, including powering up the touch screen controller that is otherwise powered down; and

detecting at least one touch position on the touch screen in which the outer plate is pressed against the inner plate, and if the touch position corresponds to the power-on area of the touch screen, maintaining the power to the telephone, and if not, turning the telephone off.

2. A portable telephone comprising:

an input means;

at least one power supply;

at least one touch screen display, said touch screen controlled by a touch screen controller and being divided into at least a power-on section and a second section and having at least one inner conducting plate and at least one outer conducting plate that are substantially transparent and movable in relation to one another between a first position in which the plates are spaced apart and a second position in which the plates are contacted to one another by the outer plate being pressed against the inner plate using the input means;

a voltage controlled switch coupled to the conducting plates and adapted to turn on the power of the portable telephone, including powering up the touch screen controller that is otherwise powered down, upon receipt of a signal indicating the outer plate being pressed against the inner plate from the input means; and

the touch screen controller adapted to detect at least one touch position on the touch screen in which the outer plate is pressed against the inner plate and keep the power on only if the touch position corresponds to a power-on area of the touch screen.

3. The portable telephone of claim **2**, wherein the input means is at least one of a keypad having a plurality of keys and a direct activation means of providing pressure against the touch screen display.

4. The portable telephone according to claim **3**, wherein the keypad is provided on a movable housing element coupled to the portable telephone, such as a flip.

5. The portable telephone according to claim **3**, wherein the touch screen display further comprises a user data area divided into multiple sub-areas corresponding to the keys of the keypad.

6. The portable telephone of claim **2**, wherein the power supply is a battery.

7. The portable telephone according to claim **2**, wherein the voltage controlled switch comprise a control means adapted to enable a voltage controlled regulator to connect said power supply to said portable telephone.

8. The portable telephone according to claim **2**, wherein when said plates are in said second position, both plates will obtain a same potential for transferring signals to the voltage controlled switch adapted to connect the power supply to the portable telephone.

9. The portable telephone according to claim **8**, wherein said potential is low by means of both plates being connected to a ground potential.

10. The portable telephone according to claim **2**, wherein when the plates are in the first position, an outer plate potential is high and an inner plate potential is low for transferring signals to the voltage controlled switch adapted to disconnect the power supply from the portable telephone.

11. The portable telephone according to claim **10**, wherein said inner plate low potential is obtained by connecting the inner plate to a ground potential, and the outer plate high potential is obtained by using a pull up resistor connecting the outer plate to a voltage source.

12. The portable telephone according to claim **2**, wherein the portable telephone is a mobile telephone.

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